Copernicus Institute
Research Institute for Sustainable Development and Innovation

Universiteit Utrecht

Comparing Approaches to Systems of Innovation:

—Confronting to the Chinese Telecommunication Sector

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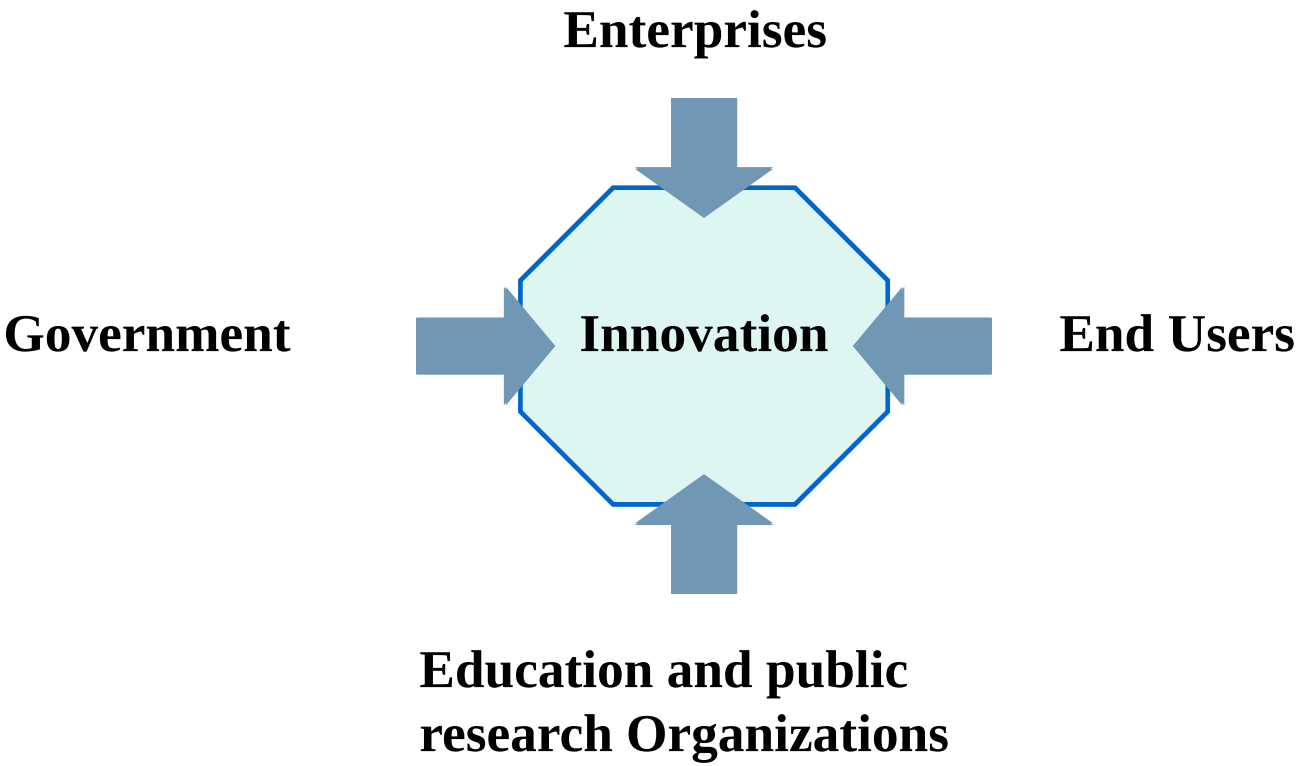
Motivation

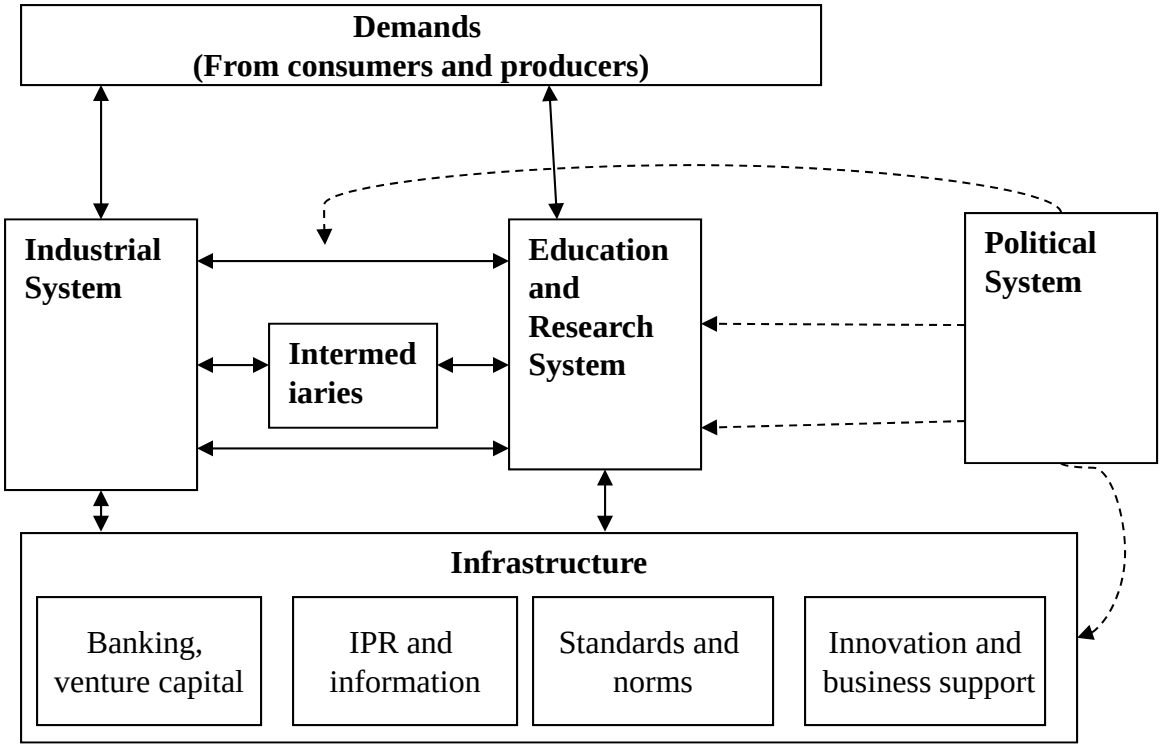
1. PHD topic: The relationship between standardisation and innovation system in two telecommunication technologies: a comparison of China and the Netherlands, 1990-2005
2. Three research categories: standardization process, innovation system and Chinese and the Netherlands' telecommunication industry
3. To look for an optical combined approach to analyze linkages between standardization and innovation system

Contents

Research Background



Innovation system



Source from: Kuhlman S. &Armold 2001

Research Question

What are the strengths and weaknesses of national innovation system, regional innovation system and sectoral innovation system as they are applying, in general?

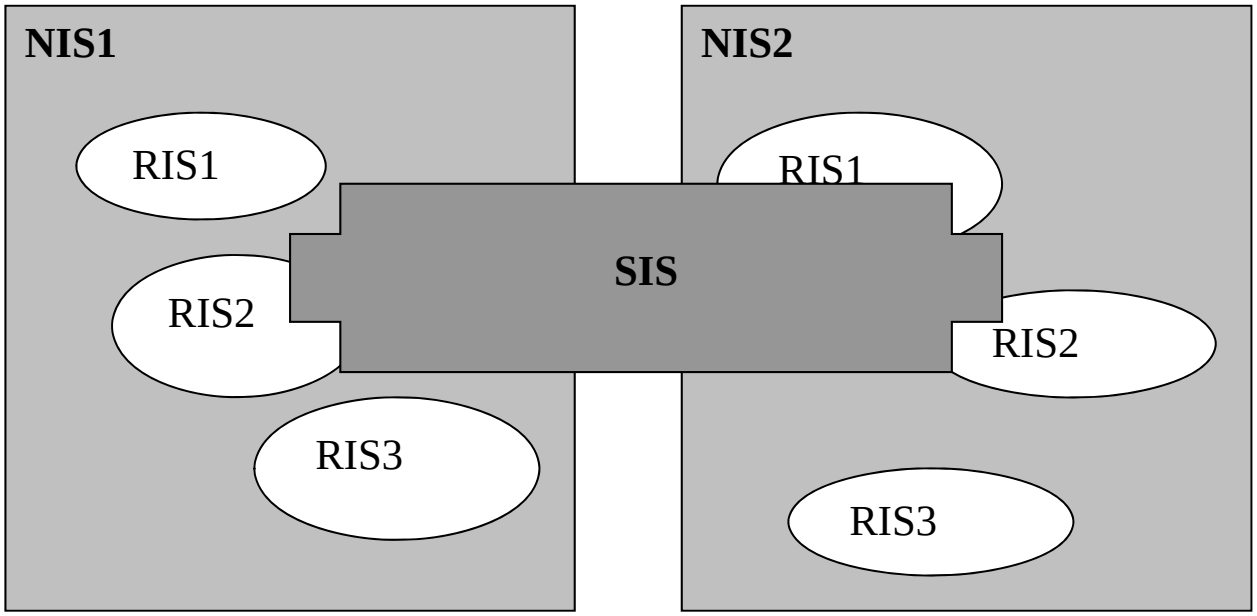
Definitions of NIS, RIS and SIS

The definition of NIS	The definition of RIS (Chung, 2002)	The definition of SIS (Carsson 1991)
Lundvall defines NIS as 'a system of innovation ……constituted by elements and relationships which interact in the production, diffusion and use of new and economically useful knowledge' **It encompasses all interrelated institutional actors that create, diffuse, and exploit innovations**	The definition of RIS : 'a complex of innovation actors and institutions in a region that are directly related with the generation, diffusion, and appropriation of technological innovation and an interrelationship between these innovation actors'	They define SIS as networks of agents Interacting in a specific technology area for purpose of technology flows, which are supported by institutional infrastructure creating the knowledge and information.

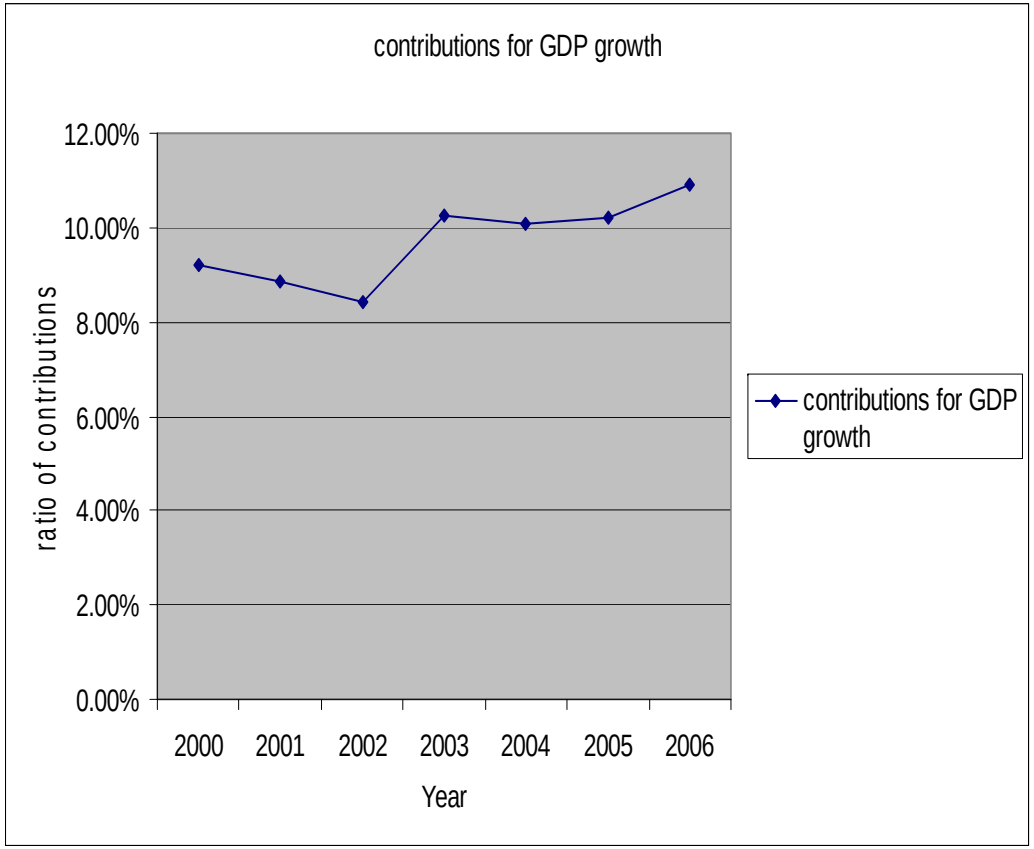
Comparison of three approaches

Common Elements	NIS	RIS	SIS
Main actors	➢ Industry ➢ Government ➢ Education and Research organizations	➢ Universities ➢ Industrial enterprises ➢ Public research organization	➢ Firms ➢ Non-firm Organizations ➢ individuals
Institution	➢ National policies ➢ Laws ➢ National finance supports	➢ Regional policies ➢ Informal Institutions depending of trust and reliability among the actors	➢ Standards ➢ Regulations ➢ Routines
Main Interaction	➢ joint industry activities ➢ R&D collaboration ➢ Technology diffusion ➢ Personnel mobility	➢ Inter-firms ➢ interactions ➢ External interactions for firms with research organizations ➢ R&D collaboration	➢ Inter-industry ➢ Interactions ➢ Interactions among firms and non-firm organizations

Boundary relationship between NIS, RIS and SIS



Why Chinese Telecom?



The number of subscription at the end of 2006

using fixed phone : 367 million

Ratio of per 100: 28.1%

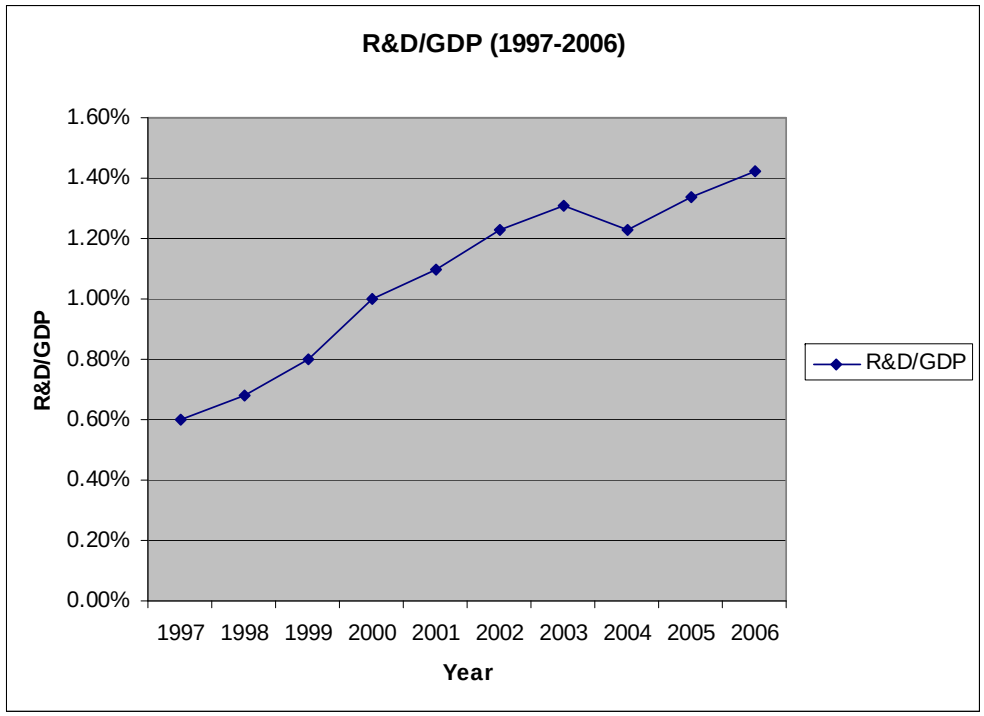
Using mobile phone:461 million

Ratio of per 100: 35.3%

Using the internet: 51 million

Popularizing rate: 3.5%

R&D Indicator



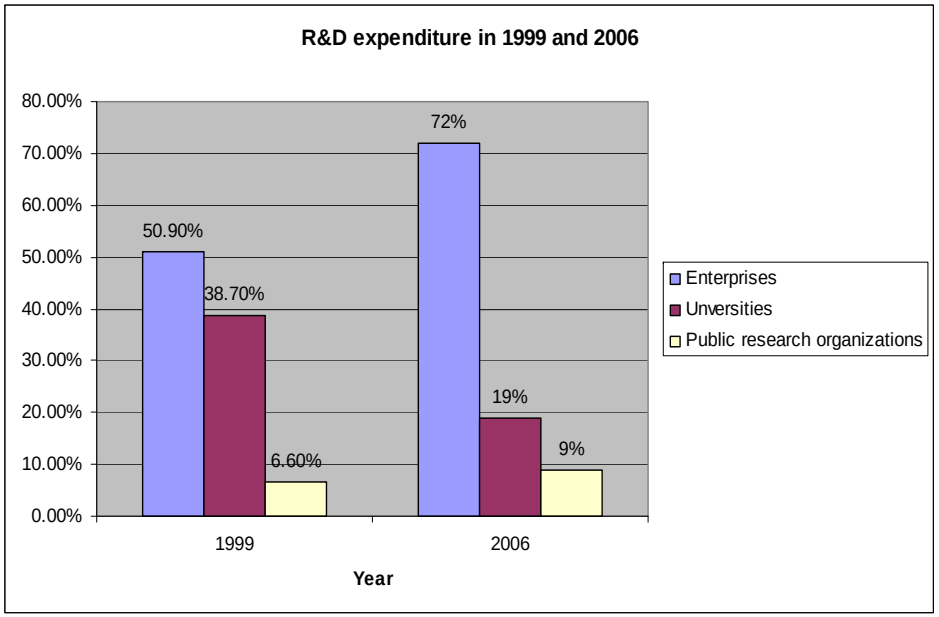
• R&D investment increases every year, and is doubled from 1997 to 2006

•The ratio of GDP is still lower than the average level

•China is trying to transfer from resource-base to knowledge-base

R&D Indicator

The main performers of the innovation activities are enterprises, universities and public research organizations.



- The enterprises focus on in-house R&D, instead of only import the technology
- University's R&D expenditure decreases rapidly, because of the cooperation with the enterprises
- Public research organizations' R&D expenditure is stable

NIS and Chinese Telecom

Three stages of the development of Chinese telecommunication sector:

1979 to 1983

This period is characterized by full dependency upon importation

1984 to 1993

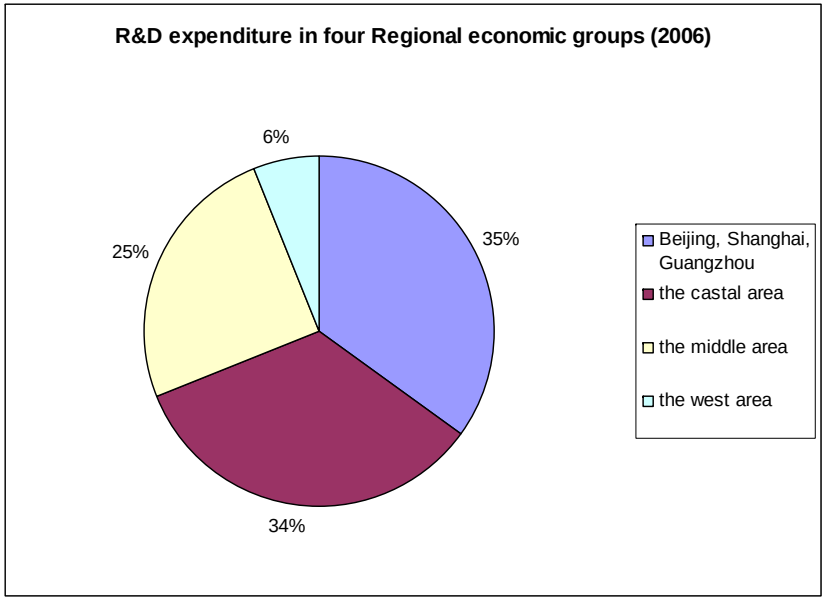
- Foreign technologies were transferred to china via joint ventures
- The domestic enterprises began to take-off

1994 to present

Two revolutions:

- The liberalization in The telecommunication market
- China joined the WTO

RIS and Chinese Telecom



SIS and Chinese Telecom

Seven functions of innovation system (adapted from Hekkert et al.(2007))

1. **Entrepreneurial activities**
2. **Knowledge development**
3. **Knowledge diffusion through networks**
4. **Guidance of the search**
5. **Market formulation**
6. **Resources mobilization**
7. **Creation of legitimacy/counteract resistance to change**

Strengths of three approaches

Approaches	Strengths
NIS	1. focuses on studying macro-economy growth and national innovation capacity 2. a useful tool for the comparative analysis between countries 3. provides a comprehensive insight at the national level for policy makers
RIS	1. focuses on studying micro-economy growth 2. reveals the regional innovation capacity 3. prevents the disequilibrium of regional technological and economic capacities
SIS	1. analyzes a specific technology in social context 2. provides a clear direction for policy actions 3. better understanding of the innovation system dynamics

Weaknesses of three approaches

Approaches	Weaknesses
NIS	1. It is difficult to apply without a research framework
RIS	1. vague research boundary 2. the influence from the central government is ignored
SIS	1. too broad and vague boundary of inter-technological links among the actors

Further Research and Discussion

Further Research Questions:

1. What are the roles of the standards in the innovation system?
2. How does the standardization link with the innovation system?

Discussion:

It is not possible to identify an optimal or ideal approach, could we combine two approaches into one based on their strengths and weaknesses to analyze a specific sector at the national level?

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Thanks for your attention

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